

THE CANADIAN ARCHITECT AND BUILDER

Vol. XVII.—No. 4.

TORONTO AND MONTREAL, CANADA, APRIL, 1904

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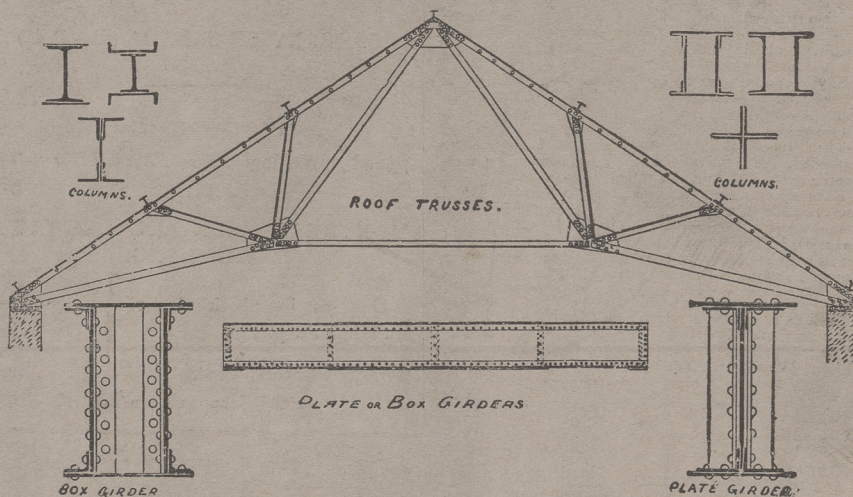
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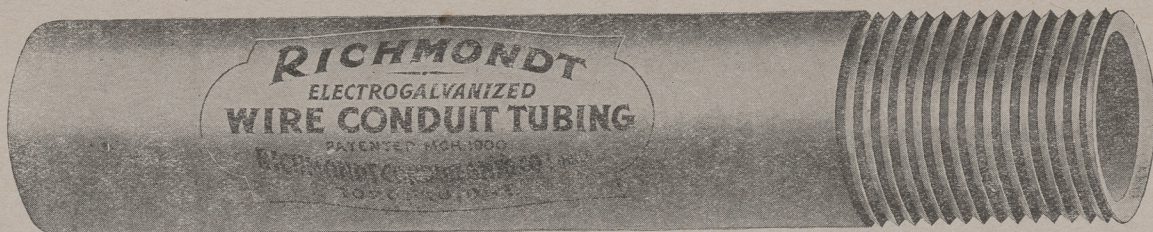
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The Canadian Architect and Builder

VOL. XVII.—NO. 196.

APRIL, 1904.

ILLUSTRATIONS ON SHEETS.

House in Delaware Avenue, Toronto.—R. J. Edwards, Architect.
House in Chestnut Park, Toronto.—Langley & Langley, Architects.
Stable.—Beaumont Jarvis, Architect.
Banking Room, Bank of British North America, Toronto.—Burke & Horwood, Architects.

ADDITIONAL ILLUSTRATIONS IN ARCHITECTS' EDITION.

Portion of Main Facade, Palazzo di Brera, Milan.—Measured and Drawn by Mr. Cecil Burgess.

ILLUSTRATIONS IN TEXT.

Views of Toronto Fire.

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SPECIAL CONTRIBUTORS.

MR. W. A. LANGTON, Architect, London, Eng.
" EDMUND BURKE, " Toronto.
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" Prof. Percy E. Nobbs, Montreal.
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" W. H. ELLIOTT, Toronto.
" A. F. DUNLOP, R.C.A., Architect, Montreal.
" FRED. T. HODGSON, Architect, Collingwood, Ont.

Another Combine, The manufacturers of builders' hardware in the United States are reported to have come to an understanding whereby all the designs have been classified and priced. It is said that the better goods are to be advanced from 25 to 50 per cent. at once, and that a 10 per cent. advance on all goods is slated for the near future.

Students' Competition. A considerable number of architects and architectural students visited and inspected the exhibition at our Montreal office of drawings submitted in our recent students' competition. Drawings submitted in future competitions will in like manner be exhibited in Montreal, in the hope that they may awaken interest and a spirit of emulation among students of architecture in that city.

The Law Affecting Architects and Contractors. Architects and contractors, especially those who now or in the future may have to do with the erection of buildings in the Province of Quebec, may with profit read the series of lectures by Mr. J. S. Archibald delivered before the P.Q.A.A., publication of which is commenced in the present number. These lectures deal in a very clear and concise manner with the legal responsibilities of architects and contractors under the Civil Code of the Province of Quebec.

The Study of Building Sites. We were much struck with the remark of a young architect while showing the plans which he was preparing for some new houses, that he

had not visited the site and did not know its exact location on the street. We wondered how far these houses when built would prove satisfactory to the owner and future occupants. Architects young and old should bear in mind that a careful study of the site is the first requisite to the production of a successful building, and is therefore a duty which they owe to themselves as well as to their clients.

Cement Construction. Several articles are in course of preparation for our May number treating of the physical properties of cement, methods of cement testing and using cement in construction. Particular reference will be made to methods of reinforcing concrete with steel. In view of the truly wonderful progress which is taking place in the use of cement for construction purposes and the certainty that the material will come into more general use in the future, a consideration of the subject at some length in these columns seems advisable and likely to be of interest and value to our readers.

Safety From Frost. The experience of last winter should lead to the adoption by Toronto architects, engineers and contractors of a new formula to govern the depth to which foundations should be carried in order to escape frost. The practice until this year was to regard 3 feet 6 inches as the utmost limit of depth necessary to ensure safety. This theory has been dispelled by the extreme frost of last winter, which in some instances caused pipes to freeze at a depth of five feet below the street surface. In Montreal,

where the winters are usually much more severe than in Toronto, the rule is to place all water and other pipes at least seven feet below ground.

The Collapse of a New York Steel Building

On March 2nd the Darlington hotel building, an eleven storey steel frame structure in course of erection at 59 West 46th street, New York, suddenly collapsed and twenty-one persons were killed. There was an outer casing of brickwork covering the steel framework. The floors were supported by cast-iron columns seated on separate off-set brick piers with concrete footings and granite caps and placed 13 feet apart. These columns carried I-beam girders and floor beams about 12 and 8 inches depth, the average spacing of the floor beams being 4 feet. Beam, column and girder connections and splices were, according to the specifications, to be bolted, no rivets being used. There were no knee or other braces. The building was designed to carry a floor load of 130 lbs. per square foot. Beams and girders were proportioned for working loads of one-quarter of this load and columns for one-fifth. The architects who prepared the plans and specifications were not employed to superintend the construction, but this duty was largely entrusted to one of their draftsmen who left their employ for the purpose. The original plans were submitted to the Building Department and approved. Afterwards these plans were changed and a new set of plans submitted which were rejected; then a third set was prepared which were also rejected. The contractors then proceeded with the erection of the building in violation of a notice from the Building Department that operations must cease until the building laws were complied with. Objection was made by the Department to the improper method of bolting beam, girder and column connections, and to the relative rate of construction of walls and steel work. The Building Department found itself powerless, however, to enforce the building regulations, and the contractors taking advantage of this fact, proceeded with the construction of the building.

When the collapse came a number of arrests were made and an investigation was instituted by a Coroner's Jury to ascertain the cause. The jury reported finding the owner and steel work contractors "grossly criminally negligent in the methods adopted and followed by them in the erection of the building". The jury further made the following recommendation: We recommend that the practice of the erection of buildings without the superintendence of the original architect or a competent builder of at least five years' experience be prohibited by law. We further recommend that the Building Department of the City of New York have a corps of competent engineers to inspect the erection of all buildings requiring engineering skill, and that a copy of the approved plans of each building be kept on the premises during construction." The building regulations at present in use in New York were formulated only three or four years ago by a Commission appointed for the purpose, and were thought to be very carefully and skilfully prepared to cover all possible contingencies. The occurrence to which we have referred, however, shows them to be faulty in at least one most important particular, and should lead the authorities of New York and other cities to carefully revise and make as effective as possible their regulations governing the construction of important buildings.

THE TORONTO FIRE.

Two things have specially impressed us in connection with the disastrous fire in Toronto—one that the insurance companies required only two days to decide to advance insurance rates from 50 to 75 per cent.; the other, that the City Council of Toronto have had under consideration for two or three years the framing of an up-to-date building by-law, and no decision has yet been reached. This is a fair example of the relative speed with which private corporations work in com-



CORNER OF BAY AND WELLINGTON STREETS, NEAR WHICH THE FIRE ORIGINATED.

parison with public bodies. Perhaps the thing that most requires prompt action at the present time is the adoption and putting into force of proper building regulations. There is now an opportunity such as will probably never occur again of improving the character of buildings for business purposes. The opportunity should not be lost. It would be unreasonable to compel firms who have been burned out to defer the rebuilding of their warehouses, therefore the Mayor should insist upon immediate action being taken in the direction of



WAREHOUSES ON SOUTH SIDE OF WELLINGTON STREET, WEST OF BAY STREET.

the consideration and adoption of regulations which will insure that none but substantial buildings will be erected in the place of those destroyed.

This fire, as well as those in Baltimore, Rochester, and elsewhere has clearly demonstrated the fact that no better check can be put in the way of a conflagration such as Toronto has experienced than solid brick walls. Unfortunately, many of the warehouses which stood in the path of this fire were so flimsily constructed that the walls were not strong enough to stand

House in Delaware Av. Toronto.



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South Elevation
8" Scale

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Architect
Toronto.

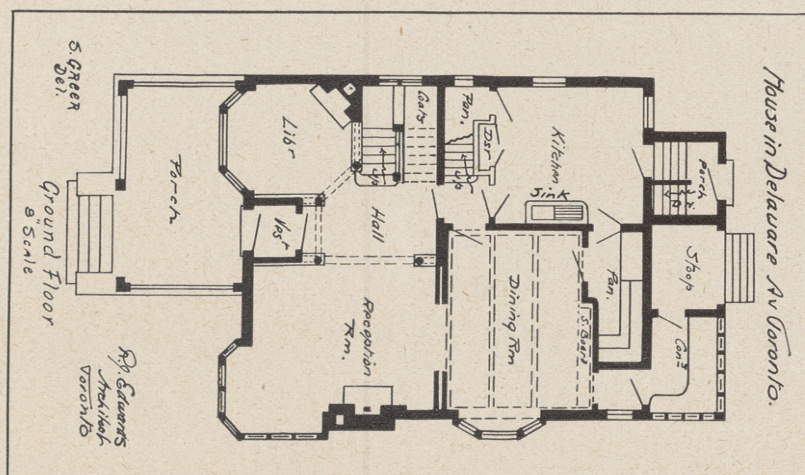
House in Delaware Av. Toronto.



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Front Elevation
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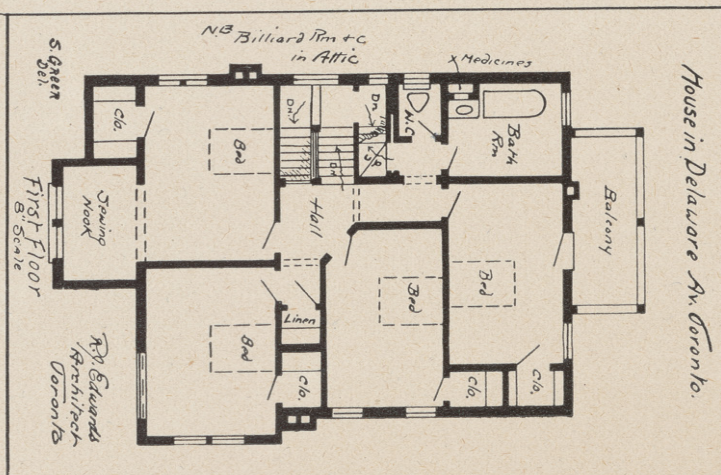
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Ground Floor
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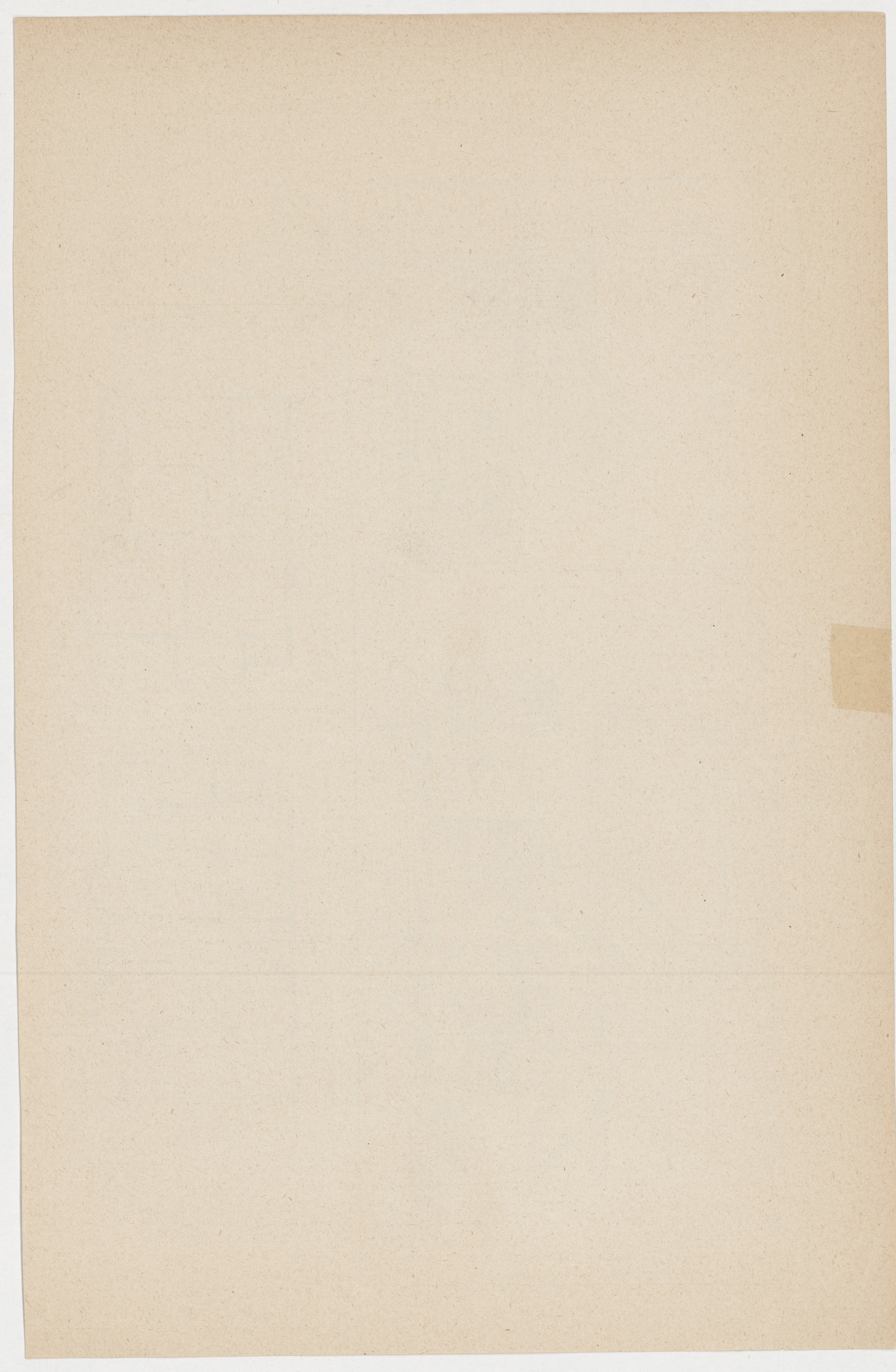
House in Delaware Av. Toronto.



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First Floor
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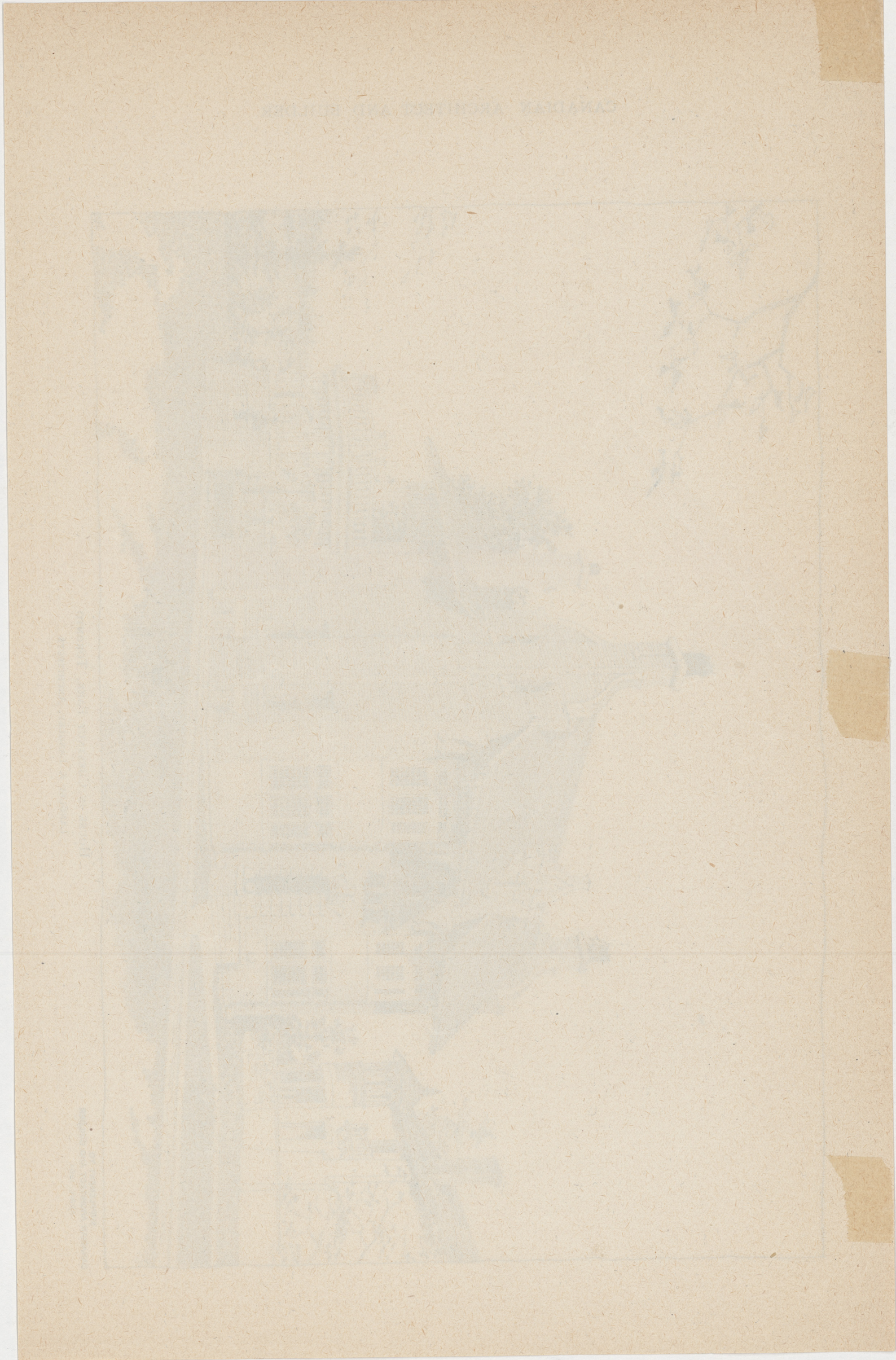
House in Delaware Av. Toronto.



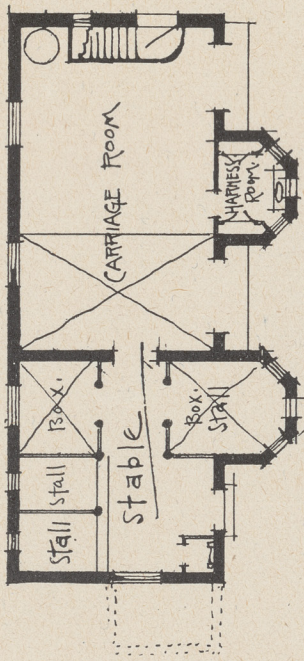


SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
APRIL, 1904

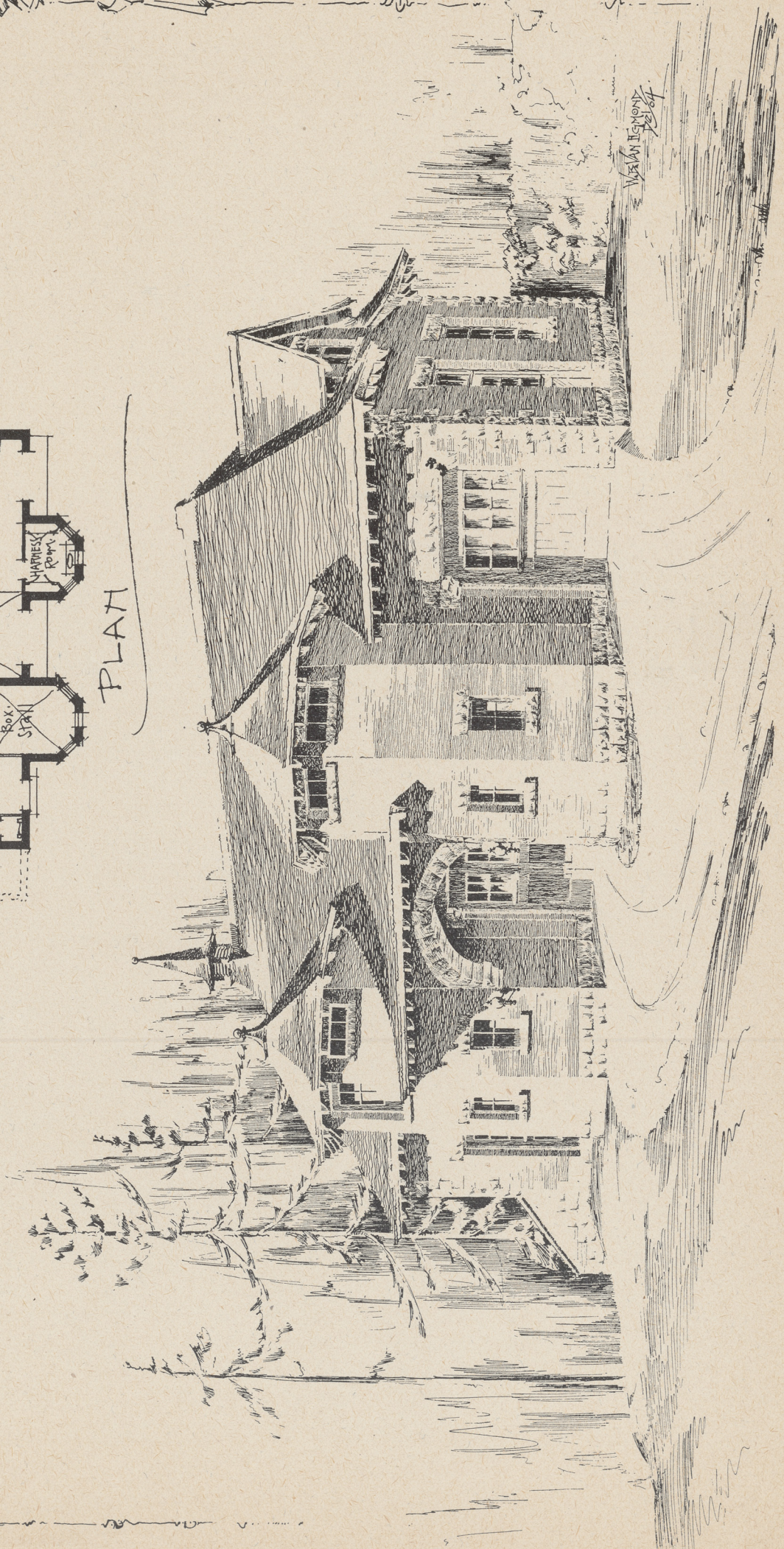
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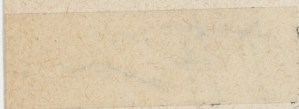
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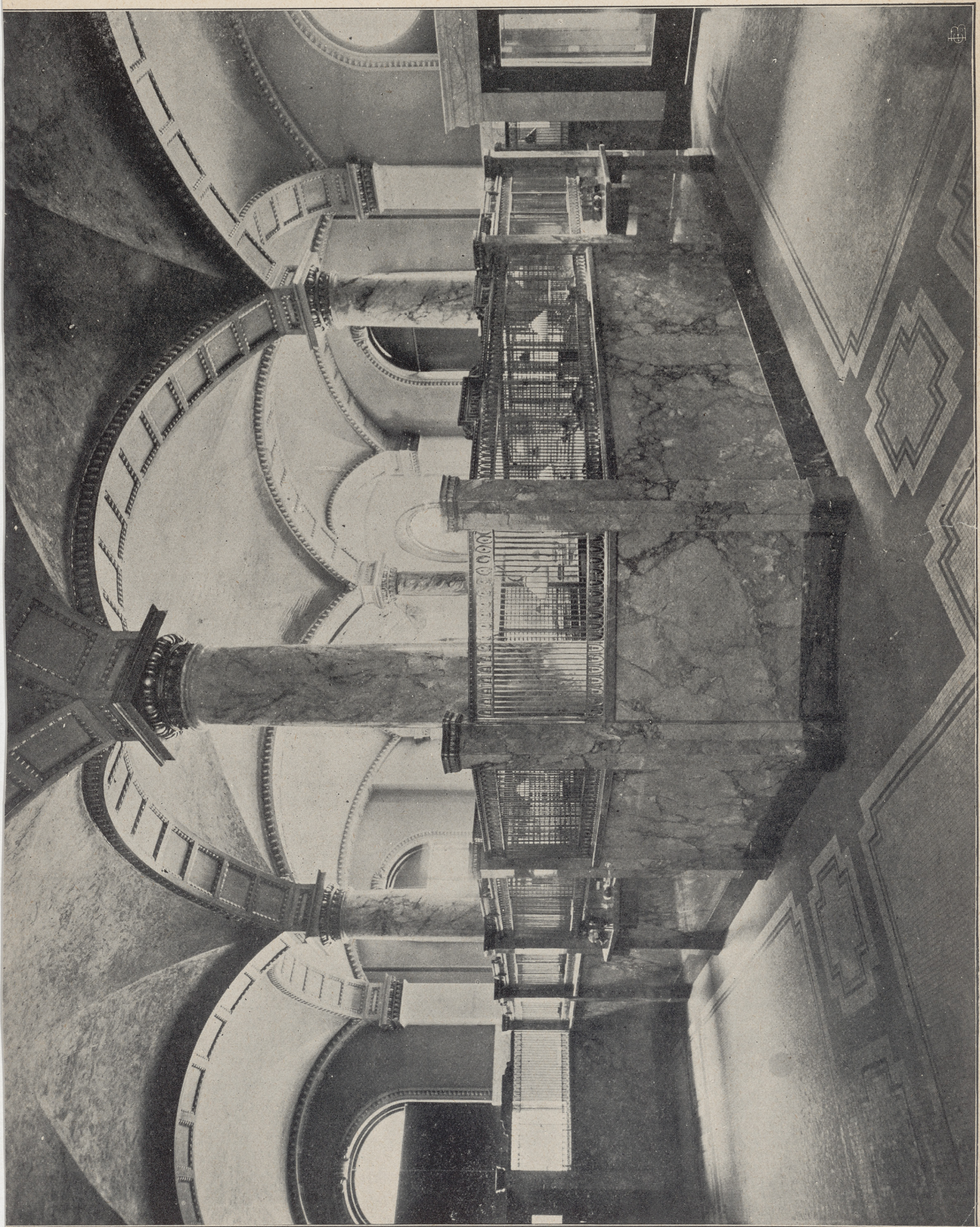


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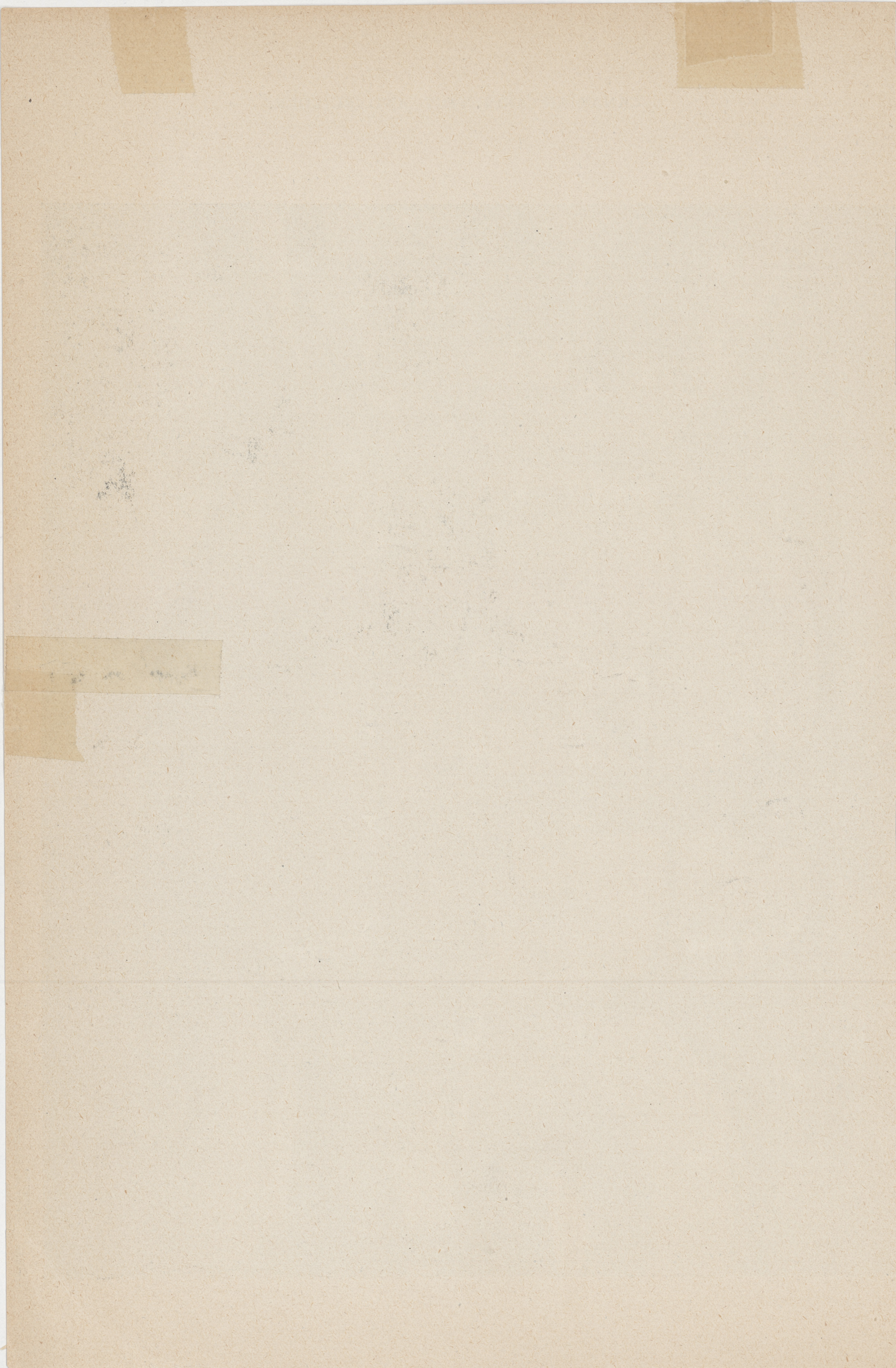


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alone, and when attacked by the fire toppled over leaving a clear path for the extension of the conflagration.

The insurance companies should change their methods of assessing buildings, and offer greater inducements than heretofore to the owners of substantially constructed buildings. In the past buildings have been simply grouped into classes, each class being rated the same regardless of differences in construction. This method should no longer prevail, but substantial inducement should be given those who will put up solidly built structures and employ fire-proofing methods. When it is considered what great losses have been incurred by the occupants of buildings destroyed in the recent fire because of interruption to their business, it will be seen that, apart altogether from the question of insurance rates, it would pay the owners and occupants of such buildings to use a higher standard of construction.



VIEW ON WELLINGTON STREET.

At least one important building was saved by the fact that the windows on one side were protected by iron shutters. The advantage of protecting windows by this or other methods equally effective is beyond question. The value of open spaces in preventing the progress of fire has also been demonstrated. Had it not been for the open spaces immediately to the west of the Custom House and east of the Queen's Hotel, and the fact that facing on these open spaces were walls of solid brick, the fire would doubtless have spread further in both directions. While the water pressure was very defective, yet in the face of the unfavorable weather conditions prevailing this fact had little bearing on the situation. No matter what the pressure might have been, the fire could not have been stopped by the fire brigade after it had once got headway. In this connection it seems pertinent to enquire if, by the exercise of better judgment on the part of the heads of the Fire Department, the fire might not have been confined to the building in which it originated. It is said to have started at the rear of the building, and that, instead of attacking it there, the firemen broke open the front doors, thus allowing the flames to be driven by the fierce wind through the building and across the street, setting fire to the large warehouses opposite. It would seem to be the duty of the Chief of the fire Department to direct his men on the street instead of as on this occasion entering burning buildings, where he was partially disabled, thus throwing upon the shoulders of subordinates the direction of affairs.

"Here all is sunny, and when the truant gull
Skims the green level of the lawn, his wing
Dispetals roses; here the house is framed
Of kneaded brick and plumed mountain pine,
Such clay as artists fashion, and such wood
As the tree-climbing urchin breaks.
My house, I say."

—LOUIS STEVENSON.

LESSONS FROM THE SOUTH KENSINGTON MUSEUM.

One of the best things in London is the South Kensington Museum. It shows examples of nearly every kind of design and is invaluable to designers of all kinds. Books and photographs are very well—there are books and photographs in the Museum Library—but when it comes to really feeling at home with design, to know what it is really like and measure one's mind against it with certainty, there is nothing like an example. For purposes of study it need not be the original; a model is as good. A model may fail to convey exactly the sentiment attaching to its original, or the beauty it has acquired from a bath in the atmosphere of centuries; but these are accidents which the designer's own work cannot share, and it is just as well that their attractions should not disturb his judgment as to what is essential. All that is necessary is that the actual modelling of the object should be presented to the eye; if coloured like the original when it was new, so much the better.

As a matter of fact it is a great question whether the most important part of the work of the South Kensington Museum is not done by models of its own originals, rather than by the originals themselves. Part of its work is to send out examples to Provincial Museums and Art Schools, and though it sometimes sends originals, the greater part of these little circulating exhibitions consists of models in plaster, made by workmen, attached to the Museum, who have attained to so much skill, in colouring as well as in casting, that the copies are, for practical purposes, facsimiles. They demonstrate incidentally the possibility of improving architectural casts by the application of colour; which would, in many cases, add to their instructiveness by expressing the design more perfectly. In the case of the casts which constitute the circulating exhibitions, colour is essential as part of the design of the original or to represent its material. The works exemplified are, for the most part, textiles, book binding and leather work, wood carving, silver and other surface metal work, medals, plaster work, gesso, and other decorative handiwork. The examples already prepared are in constant circulation, and a demand in any direction is met by fresh preparations. Classes of work which are not easily reproduced by casting or electrotyping, or are not sufficiently portable, are represented by photographs or coloured drawings; and there is a catalogue, 138 pages long, of books for circulation in the same manner. In addition to these the Museum has a collection of classified lantern slides on all subjects, from the composition of monumental buildings down to lace work, with catalogue numbers running to 3,000, which is available for lectures and instruction in any part of the country. The card catalogue of this collection is worth noting. Each card has, underneath the title of its subject, a print of the negative from which the slide was made, and, an application for slides for a lecture on a given subject is responded to by a set of the cards which catalogue the

illustrations of that subject; so that the lecturer can make his choice with certainty.

The special interest of these proceedings to us is that they are conducted away from London, at any distance in Great Britain or Ireland from which an application is made; and one of the directors of the Museum has expressed the opinion, not official but personal, that it is conceivable that the distance to which the material of the circulating department is sent, might be extended to the colonies. The Museum authorities seem to be always on the look out for fields for further expansion of the Museum's usefulness, and an enquiry from any bona fide Museum or School of Art in Canada would be heard with attention at any rate and might be productive.

The weak point in the situation is the absence of depositories on the other side; and, in view of the excess of advantage over cost, one wonders at it. Toronto ought to have a museum of architecture and decorative art. It is a mistake to try to go on without one; and to have one is not such a great affair after all in the way of cost. It is not necessary to have originals to do good work; and it is not necessary to have everything that can be got together. Many of the old world museums are fuller than would be necessary for us, or indeed desirable. For them there is a mixed motive. There are more critics of the past among their frequenters than creators of the future, and for historical purposes a collection cannot be too complete. But what we, in Canada, want to study is not history in design but design in history. We need only a skeleton collection, the elemental types and nothing else; but we need these if we are not to flounder about, arriving at last, if we arrive anywhere at all, only at a point from which we should have started.

A well selected collection, arranged according to subject only, ignoring history as a theme by itself, would not be too extensive either to be purchased or housed. The greater part of such a collection has already been cast, and there is nothing to prevent special castings being made to complete a sequence or scheme.

Casts of the various objects of manufacture would be for the most part inexpensive. It is architecture that costs sums to cast which require consideration; yet architecture is, if anything, more in need of models than the manufacturing arts, for its originals, while the buildings exist, cannot be transported. The cost of an architectural room may be fairly gathered from an examination of the rooms at the South Kensington Museum; for the cost of each piece that has been bought is, as a rule, printed in a corner of the label which gives the name and date of the object from which the cast was taken. The examples below are given, not as subjects particularly suitable for a Toronto gallery, but as types of size in relation to cost. Size at the South Kensington Museum runs large. They have, in casts, the whole three portals of the 13th Century Gothic Cathedral of Santiago de Compostella, in Spain; measuring 57 feet in width, covered with sculptured figures in all possible and impossible places, and costing £2,300. They have the whole of Trajan's column (the top half standing on the ground beside the bottom half); the whole doorway of San Petronio at Bologna, 51 ft. by 40 ft.; the whole of the mantel from the Palais de Justice at Bruges, including 6 or 8 feet pro-

jection of the ceiling above it. In originals, they have a Flemish rood screen 42 ft. by 30 ft. costing £900; and the timbered front of the Sir Paul Pindar house as it stood on Bishopsgate Street, except the gable. But not to consider objects of this magnitude for the beginning of a collection, here are some examples, selected as being familiar either as individuals or as types:

1. Niccolo Pisano's pulpit in the Duomo of Pisa; panels crowded with figures half detached; 8 columns resting on beasts and groups of figures; a sufficient height of the column, against which the pulpit is set, included, and the steps which go round the column. Over all about 14 ft. x 18 ft. x 13 ft. high. Cost £320.

2. Tomb of Carlo Marsuppini in Santa Croce, Florence. Elaborate 15th century work. Carved podium; niche with columns, entablature and circular pediment; 12 ft. wide by 20 ft. high over all; pair of figures at base; pair of figures on cornice; bas relief in tympanum; elaborate sarcophagus in niche, with recumbent figure on top. £210.

3. Donatello's Singing Gallery for the cathedral at Florence. Double planes, columns in front of figures; about 18 ft. by 14 ft. and 4 ft. projection. £152.

4. 13th Century Doorway from Norwich Cathedral. Jambs recessed four times with columns in front of mouldings. Enthroned figure with angels on soffit of the arch. Over all 11 ft. by 15 ft. high. £120.

5. Choir screen from cathedral at Hildesheim. Arcade of 13 arches; 12 filled each with a figure, the 13th a doorway. Smaller open arcade above. 25 ft. long by 11 ft. high. £81 10s.

6. Tomb of Filippo Decio from the Campo Santo at Pisa. Half reclining figure on top reading a book. The arms and book being partly free complicate casting. 6 ft. 6 in wide, 9 ft. high. £45.

7. Chimney piece from Hotel Lallemand Bourges, French, 16th Century. Large fireplace, carved projecting top and portion of ceiling. 12 ft. x 13 ft. £44.

8. Doorway, 15th Century Italian. Pilasters, lintel and cornice; all carved. 10 ft. 6 in. by 12 ft. high. £34 10s.

9. Portion of Dutch screen, with 5 elaborate 16th Century columns. 11 ft. x 6 ft. £9 18s.

10. Anglo Saxon cross, at least 15 ft. high, with low relief carving. £7 15s.

11. There are several valuable models to scale, of buildings or rooms. These appear to have been made to order but the cost is not attached. Models of sections of Italian buildings, decorated by painting, probably cost serious sums to produce; but possibilities are shown by a model of Fergusson's theoretical restoration of the Parthenon, which cost only 14 shillings.

Some of the Italian originals at the South Kensington Museum were got at prices which tempt one to stray from decision in favour of casts. £75 for a black marble doorway 9 or 10 ft. high, carved all over with cinque cento carving, is cost price or less; £16 for a carved stone mantel 8 ft. by 12 ft. is certainly less than cost. But buying prices are not what they used to be, and as a matter of fact these particular pieces are not such good work as the subjects in the cast room; and a cast on the same scale costs less.

If there is to be any dealing in originals, England is the country for it. There is a continual pulling down and rebuilding going on and good details find their way to dealers or to museums. The South Kensington Museum has some beautiful specimens of this kind, gifts from the owners of old buildings which were pulled down.

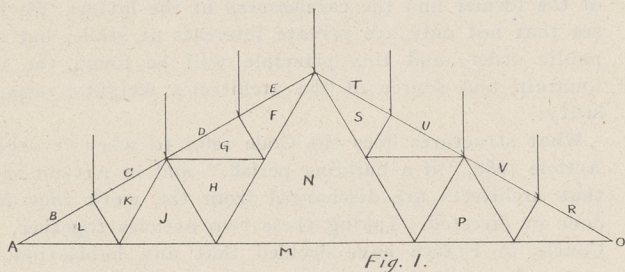
In fact it is well worth noting in conclusion that gifts to the South Kensington Museum far exceed in number and value, its purchases. It is also the repository of some fine collections which the owners have no means of housing themselves. At first as a nucleus, later as a recognized centre, the Museum has attracted gifts and loans, which is also instructive.

W. A. LANGTON.

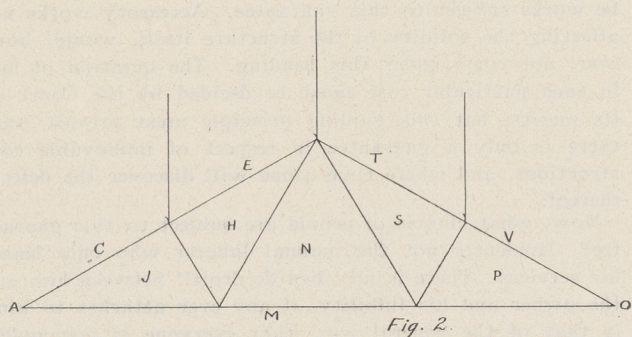
THE FINK TRUSS BY GRAPHICAL STATICS.

BY W. H. B., BERLIN, ONT.

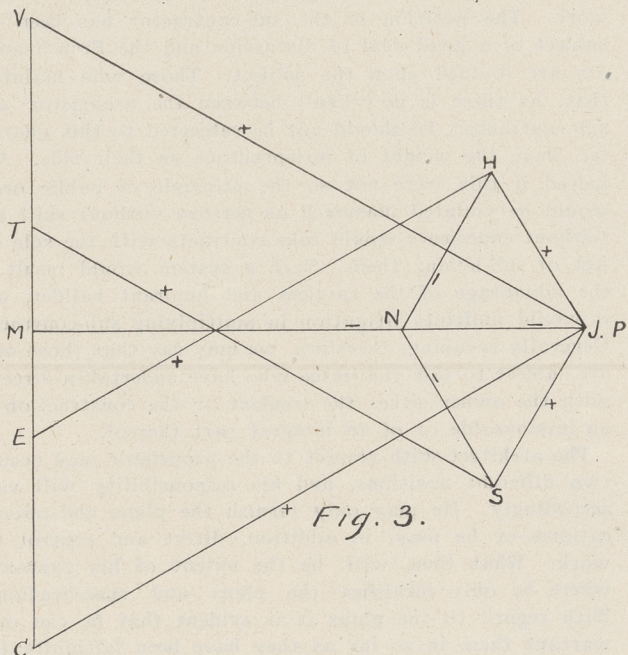
Professor Wright's solution in the March number is ingenious, and roundabout. Here is another:



Assume a vertical load of 10 units applied at each panel point. Consider first the primary members of the truss, giving a frame of single triangulation, Fig. 2.



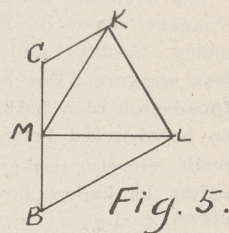
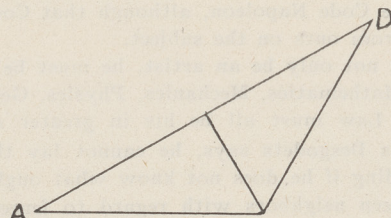
The load BC, 10, is carried 5 to A and adds 5 to CD; DE adds 5 to CD and 5 to ET; and so on. Ignore loads at A and O as they do not affect the frame. There remain loads CE, ET, and TV, 20 each. The stress diagram, Fig. 3, easily follows:



VTEC MV is the force polygon, made up of the loads VT, TE, and EC, and the two reactions CM and MV. It is a straight line because all the forces applied to the frame are parallel. Beginning at point O of the frame draw, in the stress diagram, from the ends of MV, the known force at O, the two lines VP, and PM parallel to VP and PM of the frame. The force MV, the reaction at support O, is upward. Following around the triangle in the direction given by that of the known force, VP is found to be in compression because the direction is towards O, the apex, and PM

in tension because the direction is away from O. Mark these lines at once, in the stress diagram, + for compression and — for tension. Pass next to the apex SPVT of the frame, because the load VT and the stress VP are known. Draw PS and ST parallel to the corresponding lines of the frame. Both of these stresses are found to be compression. Proceed in like manner throughout the frame to the support A. For the closing line, the stress JC, the points J and C are fixed and the line must at the same time be parallel to the frame line JC Fig. 2. If the procedure has been correct this will be so. With the reaction line, CM, the operation is carried back to the point M from which it started, and the necessary check of its correctness is had.

Consider next the secondary stresses induced by transference of the intermediate loads to the main panel points. In the present case one determination only is required. Take the frame consisting of the triangles L and K Fig. 1, shown separately in Fig. 4. The supports are A and D. Fig. 5 is the stress diagram:



The stresses for the complete frame, Fig. 1, are obtained by adding the respective stresses of Fig. 5 to those of Fig. 3. BL Fig. 5, and CJ Fig. 3, give the required stress BL; CK and CJ give CK; BL and EH give DG; and so on. In the bottom chord the end panels only are affected by the secondary system. LK, KJ, and the similar members throughout the frame are affected by the secondary loads only, while stresses JH, HN, etc., are obtained from the assumed primary loading only.

It will be seen that this solution gives the same stresses as that of Professor Wright, whose solution would not be possible were the stresses LK, KJ, etc., due to anything else than the loads at the secondary panel points alone.

The solution given is for static symmetrical loading. The maximum stresses in a roof truss are due to drifted snow and wind pressure acting on one side only. These forces may cause reversal of some of the stresses due to static loads.

The term vector diagram is new, to the present writer at least. It may have a certain fitness in that the objective at any stage is the determination of two lines of which the directions are known. It is farfetched at best, and is an unnecessary innovation. And why deprive ourselves of the useful and expressive word "stress" which has the authority of Rankine and other foremost investigators? Professor Wright lacks a common word for tension and compression. Why interpolate "push" and "pull" when we may as well say "compression" and "tension" directly? The direction followed around the diagram governs in either case.

Some writers use — to indicate compression and + tension, on the mental association that compression subtracts from the length of a member and tension adds to it. It may be a matter of early training. The use of + for compression and — for tension has in its favor the practical, and graphically strong, argument that + is a good symbolical representation of a built compression member of a truss while — suggests a rod or bar, in tension.

THE ARCHITECT BEFORE THE LAW.*

By S. G. Archibald, Advocate.

Your President has asked me to give a course of three lectures before this Association on the subject of the Architect Before the Law, a subject as interesting as broad. It will not be my aim to cover the whole subject in detail, nor would it be possible for me to do so. I shall endeavor, therefore, to give you as complete an idea as I can, in the time at our disposal, of certain of the more important and vital questions with which architects have to deal in the daily practice of their profession, and I propose to begin with the question of the ten-year guarantee to which architects and builders are subjected.

An architect before the law is one who makes the plans and specifications for a building and who directs work, whose execution is entrusted either to a contractor or to workmen. The profession is, perhaps, the oldest of all professions. When Adam delved and Eve span, I presume Adam was his own architect; and when Noah built the ark, I presume, also, he was his own architect under the guiding hand of Providence. Since then architecture has advanced with advancing civilization and with its advance the law in respect thereto has become gradually more and more complete, more and more crystallized by commentators and judicial decisions. Our own law is that of the French law before the Code Napoleon, although that Code differs but slightly from ours on the subject.

The Architect must not only be an artist, he must be a "savant" as well. Mathematics, Mechanics, Physics, Geometry, Geology and Law must all be his in greater or less measure. For as Desgodets says, he cannot lay the foundation of a building if he does not know what ought to be observed between neighbors with regard to fences, wells, closets, cess-pools and so forth; he cannot erect it, unless he knows how he should place direct and side views, customary views and those of servitudes; and how he should place chimneys, hearths, furnaces, and galleries, and what contribution each neighbor ought to make to the mitoyen wall. He cannot cover it, unless he knows on what side and how, he must drain off the water; and finally he cannot tear it down unless he knows the precautionary measures which he must take with regard to the neighbors, who are always ready, at the least fault, to seek reparation from the proprietor. He might have added, that without some knowledge of the law of privilege, he will not know how to protect himself in respect of his payment for work done upon the building. In addition to this theoretic knowledge, his artistic sense must be highly developed, while on the other hand the range of his practical work-a-day knowledge must be almost unlimited.

As I have said, we will consider this evening the question of the "ten-year guarantee." The nature of the contract entered into between the proprietor and the architect is one of "louage d'ouvrage" or lease and hire and work—a contract by which one of the parties agrees to do something for the other in consideration of a certain price. Thus the architect leases his work represented by the plans and specifications and by his time and attention if he also directs the construction. Now, as a rule, and as a matter of common law, the reception by the proprietor of work done releases the workman in respect of that particular work, in the absence of fraud on his part; but our law governing architects in this regard is found in Articles 1688 and 2259 of the Civil Code of Lower Canada which derogate from the common law and are as follows: (1688) If a building perish in whole or in part within ten years from a defect in construction, or even from the unfavorable nature of the ground the architect superintending the work, and the builder are jointly and severally liable for the loss; and 2259 says, "after ten years, architects and contractors are discharged from the warranty of the work they have done or directed."†

While at first sight this guarantee may seem to some unduly severe, yet reflection will lead to the conviction that it is a most salutary measure. In passing this law

the Legislature had a three-fold object:—the proprietor was to be protected against his own ignorance, the architect and builder against their carelessness and neglect by means of this, wholesome threat, and the public from the danger to which it might be exposed from the ignorance of the former and the carelessness of the latter. We thus see that not only are private interests at stake, but also public order, and this principle will be found the very fountain and source of the architect's weighty responsibility.

What structures does the Code refer to when it says in Article 1688, "if a building perish," and in Article 2259—that architects are discharged from the work they have done or directed. Taking these two articles together, the Courts in France have decided that any habitation, no matter how small, for men or animals, would be considered a building. Greater repairs, modification of old buildings which would affect the solidity of the main building, the establishment of a well, of a bridge, of a terrace wall, or of chimneys have all been held by French authors to be works subject to this guarantee. Accessory works not affecting the solidity of the structure itself, would, however, not come under this heading. The question of fact in each particular case must be decided by the Court on its merits, but this guiding principle must prevail, that there is only a guarantee in respect of immovable constructions, and where time alone will discover the defects thereof.

Now, what classes of people are subject to this guarantee? Evidently not the manual laborer who only leases his services. There is no "lien de droit" between him and the owner and his liability, if any ever attaches to him, is that of the general law, that everyone is responsible for his own fault. On the other hand, the lessor of work, whose object is an immovable, is liable to this guarantee and these lessors are architects, builders and civil engineers. Under Article 1696, masons, carpenters and other workmen who undertake work by contract for a fixed price are subject to the rules prescribed in this section. They are regarded as contractors with respect to such work. The position of the sub-contractor has been the subject of a good deal of discussion and the French authors are divided upon the subject. Those who maintain that, as there is no "lien" between the proprietor and sub-contractor, he should not be subjected to this guarantee, have the weight of jurisprudence on their side. And indeed if this were not so the principle of public order would be violated inasmuch as persons without skill and without experience would take contracts with the sole object of sub-letting them. Such a system would result to the advantage of the careless and ignorant builder, and it would multiply litigation in multiplying sub-contracts. Generally speaking, therefore, we may say that those only are subject to this guarantee who have undertaken directly with the owner either the conduct or the construction of an immovable or of an integral part thereof.

The architect with respect to the proprietor may occupy two different positions, and his responsibility will vary accordingly. He may only furnish the plans and specifications—or he may, in addition, direct and control the work. What then will be the extent of his guarantee where he only furnishes the plans and specifications? With regard to the plans it is evident that he can only warrant them in so far as they have been faithfully followed. His liability therefor, will only be for defects which are the necessary consequence of the plans which he has drawn or of the specifications which he has given. Supposing that for motives of economy the proprietor himself employs the workmen to execute plans furnished by an architect, and after the building has been constructed some five or six years, it threatens to fall down. The proprietor, in order to exercise a recourse against the architect would require to prove that the plans and specifications had been followed, and that the defect lay in them and not in the construction—such a defect, for example, as a weak foundation or insufficient beams, and so forth.

So also with respect to the material, the architect will only be liable for the nature of the material which he spe-

* A series of lectures prepared for and delivered before the Province of Quebec Association of Architects, 1903, and published by permission.

† In the Province of Quebec.

cifies, but not for the quality used by the contractor. Thus, an architect who specified wood where he should have specified steel, will be liable if the building be endangered on that account. On the other hand, if he specify a material commonly believed among architects to be proper material, he will not be so liable.

A very much more important and interesting question presents itself with respect to the architect's liability for defects in the ground, where he only furnishes the plan. This point is very much controverted. Some of the French authors and notably Lepage and Guilloquard consider that the architect has no responsibility with respect to the soil, inasmuch as he may never see it, but that the contractor who is on the spot must answer alone for this. On the other hand, though this guarantee may seem almost too rigorous, there is the question of public order and safety to be considered, and the sounder conclusion would seem to be, that the architect is charged with this responsibility. The proprietor asks for a plan for a certain piece of ground. How then can the architect answer for the soundness of his plan if he does not examine the ground? How will he be able to tell of what depth his foundation should be without a careful examination of the soil? This, it seems to me, is the very first thing he should do and besides is a thing which falls specially within the sphere of his particular knowledge. Without such an examination his foundations will be the merest guess work—someone must be liable. Shall it be the contractor alone, who, as a rule, has not so special a knowledge as the architect in that respect, and who, on discovering the fault in the soil will have to come to the architect to notify him that his foundations are insufficient, and that he would do well to visit the ground in order to get some idea of what his foundation should be. Surely not. A defect in the soil is intimately connected with a defect in the plan because the plan must vary according to the soil. An error in this respect would be rather an error of conception than of execution. I am, therefore, of opinion that the architect is liable for defects in the ground even when he only furnishes the plans and specifications. It goes without saying that these defects in soil for which the architect is liable, are only such as a careful man, versed in his profession would discover upon a reasonable examination. The architect's responsibility then, is this: that he must answer for his plans, for the nature of his materials, and for the soil for which he has drawn his plans—and, of course, under the common law for his own fault which causes damage to the owner, even when the solidity of the building is not in question. If, for example, he were asked to give plans for a school capable of accommodating five hundred pupils, and after construction it was found that 300 would crowd it, he would be liable in damages for this fault. If, however, as is generally the case, the architect also direct the work, his responsibility is still more weighty. Besides, all of the obligations to which the architect who only furnishes the plans is held, he must warrant their proper execution, must see that the materials are of the proper quality and are properly used, and, generally speaking, is responsible for everything in connection with the building.

Not only, in this case, is the architect liable for defects in the soil, but he is liable for defects in construction which are only such on account of the peculiar situation of the building. Thus, for example, if the house is to be erected on a high bank exposed to heavy gales, it would be a vice of construction to roof it with slate if experience had shown that that class of roof could not properly resist heavy winds.

With respect to materials furnished by the owner, the architect is not liable unless a reasonable examination would have shown him their defective nature. If, on the other hand, they are furnished by the contractor, there can be no doubt of his liability, saving always his recourse against such contractor.

All defects absolute or negative other than those of soil or material may be called defects of construction—such, for example, as too weak foundations, insufficient dimen-

sions of any of the materials, or a lack of proportion between the different parts so as to affect the solidity of the structure.

In addition to all this there is a presumption of defect in construction under the law, when a building threatens ruin within ten years without extraordinary reason.

But not only are the architect and builder jointly and severally liable for their own work, but they are liable where they have gone on with work already commenced by others; the architect is liable where the plans are furnished by another architect, and the builder is liable where he goes on with work commenced by another. The leading case upon the subject is that of *Wardle vs. Bethune*, which was carried to the Privy Council. The facts in that case were as follows (R.L. 637):—

Wardle, a builder, contracted to build Christ Church Cathedral, in Montreal, according to plans furnished by an architect and upon foundations laid by a previous contractor and approved by an architect having charge of the work. Before the cathedral was finished the tower sank and damaged the building. The cause of the sinking was found to be the insufficiency of the foundation as planned by the original architect and constructed by the former builder. This defect, though not patent, might have been discovered by Wardle. It was proved at the trial that Wardle had no knowledge of, and took no part in the testing of the soil or in the designing or planning of the building or foundation. Under these facts the Privy Council held that the builder was responsible for such defects and was not freed from liability either by acting under the direction of his employer's architect, or by reason of the fact that the defective foundations were the work of a previous builder. This judgment was a confirmation of judgments already rendered in our Superior and Appeal Courts.

The legal question was very fully gone into on both sides and a mass of authorities cited. Counsel for Mr. Wardle argued that as the foundations were not contracted for or executed by him he could not be liable for any defect in their execution nor for any defect in the soil upon which they were built. He was only bound to put the building on the foundations as they stood, and having done that properly he had no further liability. The plans and drawings were made by an architect employed by the Cathedral, and he, and not the builder, should be held liable. For the Cathedral, the case of *Brown vs. Laurie*, the leading case in our Courts, was relied upon and it was contended that both under the old French law and under our law the builder who constructs on insufficient foundation is liable even though he acts under the orders of his employer's architect. If the obligation to answer for the foundations is a necessary part of the obligation to warrant the stability of the building, how can a distinction be made between a builder, building on his own foundation, and a builder building on a foundation made by another builder. And if a builder is not relieved by following the directions of the architect, how can he be relieved, by the fact that the foundations were already laid, from the duty of examining them. In this case, as in all others of this nature, the element of public policy is not to be lost sight of. In rendering judgment in this case, their Lordships referred to *Brown vs. Laurie*, and adopted the principles there laid down.

Their Lordships, after a discussion of the case went on to state, that the broad general rule of law—the rule certain for architects and builders in the execution of the works entrusted to them—is that there is annexed to the contract, by force of law, a warranty of the solidity of the building, that it shall stand for ten years at least; that the approval and directions of a supervising architect, or his omission to ascertain the nature of the soil of the foundation, by known and available tests does not exonerate the builder from the consequences of following such direction, or of building on the foundation without making himself sure of its sufficiency.

In connection with the same building, Scott, the architect, sued Christ Church Cathedral for commissions due him. The defence was that the Church had suffered dam-

age, for which he was responsible, which more than offset any commission due him. Scott answered that he had faithfully followed the plans of Mr. Wills, the architect, who had first been engaged for the building, and that he was not liable for defects in Mr. Wills' plans. This pretension was overruled and the Courts laid down the principle that an architect was liable even where he only followed plans of another architect handed him by his employers.

The architect is liable along with the builder for errors committed by the latter, because he is held to see that a work well conceived by him is well executed by the builder—this doctrine was illustrated in a case of *McDonald vs. David*, 14 L. C. R., 31. In this case the floor of a building on St. James street had sunk in consequence of the insufficiency of the timbers used to support the joists. It was there held that the architects, as well as the carpenters and joiners employed in the erection of the building, were jointly and severally liable for the damages incurred.

It was held in a case of *Cowen vs. Evans* that where a contractor undertakes certain works for the proprietor of a building for a certain price, independently of the other contractors, and not having the general direction of the works, he is not liable for the faults of the other contractors. In this case Cowen put a brick wall on the stone foundation of another contractor; after his wall was up some way, he found defects in the foundation, pulled down his wall, and sued for annulment of the contract. He was answered that he had accepted the foundation and was responsible for it. This plea was dismissed, the Court rendering judgment in the sense just quoted. The architect must also warrant that he has not violated any of the municipal regulations or any of the laws of the neighborhood. Thus, if a mitoyen wall be pierced without the neighbor's consent, or if a chimney hearth be placed directly over beams of wood, or if a well be dug near a neighbor's wall without any counter wall being provided for, in all this class of cases the proprietor could recover not only the damage to his own building but whatever he may have been compelled to pay his neighbor for damage done to him. The architect must build so as to leave no room for any complaint on the part of the neighbors. This guarantee must be distinguished from the guarantee of solidity on the part of the architect, from which he is relieved after ten years. Under Article 1053 of our Civil Code, everyone is liable for his own fault which causes damage to another. Prescription, therefore, of this action will only begin to run against the owner from the moment when he had knowledge of it and would not be acquired in favor of the architect for 30 years from that date. This, at least, is the opinion of the majority of the authors, though Duvergier, Troplong, Fremy-Ligneville and Perriquet consider that it is prescribed in ten years—and is in the same position in that respect as the guarantee with respect to solidity. This, however, is hardly a question of practical utility. It will be time enough for you to discuss it, when you are actually troubled with it. If a fire were caused through a beam, placed underneath a hearth, becoming ignited, the action against the architect would lie from the moment of the fire whenever it occurred, and would only prescribe by thirty years. The guarantee of solidity, on the other hand, only lasts for ten years, because the law has fixed this as an arbitrary period after which the building will be presumed to have fallen through some other cause than a defect in construction. The practical effect of this is, that a defect which doesn't threaten the ruin of the building for ten years is no defect at all. Even should the whole edifice crumble to the earth in its eleventh year, yet would there be no liability on the architect's part, if no fraud is alleged against him. Not only is there a presumption that the building was properly constructed; there is more, there is an actual bar to any action on the part of the proprietor, who will not be admitted to prove, even out of the mouth of the architect himself, that there was any defect in construction. Questions of guarantee, however, are of no importance the moment fraud is alleged. Everyone is

liable for his fraud. If, for example, you have purported to build a stone wall three feet thick, but have in reality filled in the centre with rubbish and have merely put on a stone facing, you could not possibly hope to be discharged in any other way than by thirty years without action on the part of the owner from the date of the discovery of the fraud.

We have seen that the architect under the law is liable for every derogation from the principles of his art and for every infraction of the rules and laws which, as a professional man, he ought to know. Can he, by contract with the proprietor, rid himself of this weighty burden of responsibility? What if, when he has pointed out to the proprietor the defects in the soil or in the material or in the plans furnished him, the proprietor insists on his proceeding and contracts to relieve him from the guarantee imposed upon him by law. What then is his position? A glance at the principle in virtue of which this responsibility is placed upon the architect will give us the answer. Public order and safety are concerned, and private individuals cannot by contract derogate from that which concerns public order. The architect is not relieved in such a case and his duty to himself and the public is to refuse to proceed with the work. It, of course, goes without saying that he is not responsible towards the proprietor who has so released him, but he would be towards third persons damaged in any way by the ruin of the building.

It is often important to establish the exact day from which this guarantee will begin to run, and this will be from the date when the work was received. It will always be safer to have this fact fixed by a writing. All doubt upon this point will then be removed and the interest of both proprietor and architect better served. The question of prescription of this action has some theoretic interest, but is not of practical importance for the moment. It is contended on the one hand that the arbitrary term of ten years puts an end to any action against the proprietor even though the building have fallen down within the ten years. In other words, the owner must sue the architect before the ten years have expired. On the other hand it is argued that the fall of the building within ten years only gives rise to a right of action, which right will only be prescribed by thirty years, and this latter view seems to me the more sound of the two. The question of burden of proof with respect to this guarantee is a most interesting and important one. Does article 1688, when it says that the architect and the builder are jointly and severally liable for the loss, if the building perish within ten years from a defect in construction or from the unfavorable nature of the ground, mean that they will be held guilty until they prove themselves innocent, or does it simply bind them for ten years, when without that article they would have been discharged by the reception of the work? It can readily be seen how vitally this question interests the architect. Who must prove his case—the plaintiff who demands damages or the architect, who says "I am not responsible?"

At common law the reception of the work would discharge the workman. The proprietor has had an opportunity to examine it; has examined it and has received and paid for it, and the workman's responsibility ceases. But in this case Article 1688 specially derogates from this principle and says "architects and builders must guarantee their work for ten years." The French authors are very much divided upon this question. Troplong, Duvergier, Guillouard and Laurent argue that fault is not presumed and that all Article 1688 intended was to carry the architect outside the common law which would have liberated him from the moment his work had been received by the proprietor. These are onerous sections and must be interpreted strictly and the very fact of the reception of the work creates a presumption that it was well done. The article does not say that they are presumed to be in fault, it simply says that if the defect exist, they are liable for it. They argue, therefore, that the proprietor, plaintiff, in responsibility, must prove the fault which he alleges.

On the other hand, Marcade, Fremy-Ligneville, Aubry and Rau and others consider that until the architect

clears himself the damage caused will be presumed to be caused by his fault. This contention has the advantage of being supported by the jurisprudence in France. In my opinion, it is the correct solution. A building which falls down can only do so through defect of construction, material, or soil, or on account of some extraordinary event which could easily be established in proof. Now the architect for ten years must guarantee the building against all these causes, save the last, and it will be perfectly easy for him to make affirmative proof of any fortuitous event which may have caused the ruin, and if he can't do this, he is liable.

If this were not so, you would force the proprietor to make negative proof; because, if he must prove that defects of construction caused the ruin, he must prove the particular defects, and this, in cases where the building had fallen down, might be very difficult proof, indeed, for him to make. He would often be forced to attempt to prove that nothing else could have caused the ruin, forced to go through a process of elimination, in fact forced to make negative proof. I do not believe that that was the intention or the spirit of the law. As I have already said, the Legislature in placing this heavy responsibility on architects and builders, did so because public order and public safety were involved. Architects and builders must, at all cost, be thoroughly alive to the importance of building well and safely, and that is why this salutary burden was placed upon their shoulders. The building must stand for ten years, or the architect must show good cause for its not doing so. While this interpretation may not be in accordance with the exact wording of the Code, yet I do think it is in accordance with its spirit.

The Privy Council in the case of *Wardle vs. Bethune* already cited, while not called upon to pass upon this point, gave expression to the opinion that the onus would be on the builder in the circumstances under discussion.

It is hardly necessary for me to say that this liability of the architect or builder for the whole amount of the damage suffered, has only reference to the proprietor and that as between themselves each is liable for his own fault. Thus the architect would alone be liable for defects of construction depending solely on defects of plan. On the other hand the builder would be alone liable for his own mistakes, where the architect had only furnished the plan. Where the architect has also directed the work, each is liable for his own fault. The builder would not be received to set up the negligence of the architect with respect to a fault committed by himself. As regards third parties Article 1688, which we have been discussing, would have no application. The architect's responsibility towards them would be governed by the general law contained in Article 1053, that every one is responsible for his own fault which causes damage to another.

We have seen, therefore, gentlemen, that you are under a serious responsibility to look to it that the buildings you erect are solid and built according to the rules of the profession to which you belong, and further that you cannot liberate yourself from this burden even by contract with the proprietor, because as private individuals you cannot derogate from the laws of public order which concern all citizens and to which all private interests are subordinated.

MONTREAL LETTER.

No. I.

MONTREAL IN GENERAL.

To the student of architecture to whom the cities of Europe are beknown, some for their ostentatious splendours, others for the sake of old world charms, arrival at Montreal brings a new sensation and not one of unadulterated pleasure. Every town has its architectural character just as it has its specific odours. The best way to understand this architectural character is to arrive late in the afternoon, to feed at some famous hostelry and then sally forth into the waning light to get the general impression of things—to cross the great squares and steal around the high cathedral walls what time they stand up in all their grandeur of scale in ever deepening silhouette against a lemon sky. Daylight means details to the roving quizzical architectural eye and, details are architectural accidents whereby much good work is spoiled and little bad work is redeemed. At dusk the details are washed out and a first impression at the magic hour may be the truer as it certainly is the more lasting on this account. Unfortunately steamers which have spent the night at anchor between Montreal and Quebec are apt to arrive in the morning and after the beauties of the St. Lawrence it is forcibly brought home that "God Made the Country and Man Made the Town," and the

comparison of workmanship is trying to the latter. Thus it is conceivable that the sensation above referred to may have suffered by unfair comparison and too much sunshine upon a certain fair September day.

But to return to the general architectural character of the place, which is over theme, it must be understood that the writer finds there are many expensive buildings and some handsome ones in Montreal; there are a few really good buildings and a very few exceedingly beautiful ones, but all these are but a drop in the bucket and the average structure fronting on her streets is neither good nor beautiful—rarely sensible.

Architecture is a public art—the only truly democratic art—and a few isolated private examples however good will never redeem the architectural character of a city where the citizens dwell in ugliness. What makes the sensation above alluded to different from that produced by many other cities is the fact that there is so little decent building tradition manifesting itself. Where houses do not stand cheek by jowl they are most of them afflicted with one front and three backs and the backs are as a rule the less offensive compositions judged in pure elevation. Where houses stand hard up to each other the prevailing ideal is differentiation—this is attained by recourse to enormities in wood work with the underlying idea of a balcony as an excuse, or to crimes in zinc perpetrated with no excuse at all and a very light heart. Of material frauds—wood masquerading as stone, etc.—there is no end. Amid these distressing reflections there is one ray of hope: this caricaturing of Architecture is only a phase in the city's development, and from its very unserviceableness will succumb the rigours of a climate (which by the way a new arrival has no right to mention.)

A little closer inspection reveals the fact that two serviceable types of plain house were evolved in Montreal a short time back and it is deplorable to think that the excellent traditions of which they are manifestations have not struck deeper roots.

There are in Montreal many plain limestone houses—some quite plain—others with a soupçon of French architectural instinct—not very sincere but quite charming. Substantial houses these are, built of fair blocks of stone with reasonable tin or iron roofs and decently proportioned chimneys and windows. There are none of them quite good enough to be worth an architectural student's trouble to make measured drawings of, but they are the best things on the streets and represent a once live local building tradition at least—the kind of tradition, that is, with which the architect must saturate himself if his work is to be indigenous at all. It is the curse of the modern house that it usually proclaims pretty clearly of what stock it comes, and hides as far as possible every hint of having been bred on the soil on which it stands. Local tradition has quite died out of the building trades in most parts of England and on this side many of the towns have not yet got the length of a tradition at all; but here is Montreal with a very excellent tradition in quiet grey stone houses—and the tradition appears to have been plucked up by the roots about two score years ago, since when, chaos!—confusion worse confounded. The other type is in brick. Red brick, green shutters, white window frames, a medium pitched roof—what more can any designer want? Properly used these simple ingredients have been combined to form streets it is a pleasure to walk down, far more to live in; yet this type too has given place to the vulgarities above alluded to, and is no longer put up—nay it is being pulled down in several places at this moment.

The problem of winter glazing outside the ordinary window frames has been solved in Montreal in a more slovenly way than in other civilized cities subject to a "cool" winter. The appearance of a house depends immensely on the external window finish, and for four months of the year every house in Montreal wears spectacles which spoil the expression of eyes that might be quite pleasant. In Russia and Northern Germany the double glazing has been solved in a variety of ways, neat and handy, some of them very ingenious and all without recourse to the barbarous expedient of slapping a rough chamfered frame of inferior glass on the outer edge of the window opening.

The real difficulty which has not from its nature been better solved elsewhere is the roofing question. The slates of Montreal are very good and very ugly, and they don't improve or deteriorate with the kindly hand of time. Lead is no use. Copper goes as black as the slates. The good old tin has been out of the market goodness knows how long. Zinc and iron remain, and the genius who could give artistic expression to these obdurate and unsympathetic materials is not yet in evidence. A medium pitch roof has to be cleared of snow, a steep pitched roof is a danger to the community—a flat roof remains the best solution, but how is a building as a whole ever to look right even in the glory of evening light and growing shadows with its top shorn off and its chimneys growing like mushrooms, here and there, in a desert of asphalt and gravel?

Yes, the architects of Montreal have their little problems to solve and by degrees, if properly faced, the architectural character of the place will improve, but it is not solving the problem of designing for a flat roof treatment to put an 80° slate slip above the cornice just as an acknowledgement of the old habit of slating roofs, while a flat roof is concealed behind, nor is it any use relying on zinc "wherligigums and whigmaleeries" to distract the attention from the drawbacks of a dull sky line.

There is a little and a very little good old work in Montreal—a closer study of it would do much to improve the present state of things.

There are a few and a very few beautiful new buildings in Montreal—and these will be recorded from time to time by the

GARGOYLE.

INTERCOMMUNICATION.

[Communications sent to this department must be addressed to the editor with the name and address of the sender attached not necessarily for publication. The editor does not hold himself responsible for the expressions or opinions of correspondents, but will, nevertheless, endeavor to secure correct replies to queries sent in. We do not guarantee answers to all queries, neither do we undertake to answer questions in issue following their appearance.]

A Subscriber in a Northern Ontario town writes: Would you kindly publish for us in your next issue—

(1.) A good draft and specification for a telephone box or closet.

(2.) One of our customers proposes building a residence near a creek that flows through the town. About one-third of the sewerage of the town empties into this creek, which, however, has a good flow. Would it be at all detrimental to health to live in close proximity to this creek. The water pipe has to be carried under this creek. Would there be any danger of contamination?

ANSWER.—(No. 1.)—Without knowing all the conditions regarding position of telephone cabinet, whether in a building or not, whether one or two sides will be formed by the angle of a room, as is usual, or built clean of the wall altogether, and whether it is to be panelled, or simply built with matched stuff; these points being unknown, a drawing of any kind would likely prove wide of the mark. A specification should be quite ample to enable anyone to construct a telephone cabinet, and we will endeavor to formulate a brief one:—The cabinet should not be less than 2' 6" in the clear, inside 3' would be better. If panelled, the work should be in two thicknesses, with heavy felt paper between. Door should be in two thicknesses, with felt paper between, and woolen felt or heavy cloth should be glued in rebate of door jambs, to keep out sound. If any glass is used the sashes should be prepared to receive two thicknesses of glass with a space between the panes; doors and panelling should be screwed together through the outside face. The ceiling should be covered on the underside with heavy felt-paper or cloth. A tight-fitting plush carpet should be laid on the floor, with heavy paper underneath it. If the cabinet is to be built with ordinary matched stuff, put heavy felt paper on the outside walls, and put a second facing of boards over this. Windows and door to be finished like panelled cabinet described.

No. 2.—Much depends on the flow of water, and the distance from the house the sewerage enters the creek, and the amount flowing in. If the residence is a couple of hundred feet from the creek, and the exit pipe is up stream 75 or 100 yards, and the flow of water is 4 to 5 miles an hour, the locality may be considered fairly safe. If less than the figures given, the sewerage may become offensive, but not dangerous. The water-pipes being under the bed of the creek, it is not likely the water flowing through the pipe will be contaminated, should there be a defect in the pipe, which is not likely—the pressure of the water within, being greater than the pressure without will prevent any water from the stream working its way into the main.

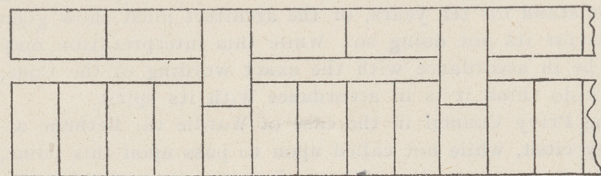
A Northwest subscriber asks:—will you kindly give me, through your columns, the name of a house that carry or manufacture the machinery and lead necessary for the manufacture of leaded glass windows.

ANSWER—The machinery for preparing lead for the making of lead windows can only be obtained in England. The Canada Metal Company, William St; the

the Ontario Lead Works, Richmond St. East and the James Robertson Company, King St West, all of Toronto, supply lead specially prepared for this purpose. Toronto glass firms get their supplies of lead from these firms, thus avoiding the necessity for using machines. We have no doubt, if you write these firms, they will send you their catalogues and full information regarding this material.

From "Young Builder"—I am in search of information as to the methods of building brick houses having hollow walls. The walls are to be nine inches thick on the outside with a two inch space, then a four inch wall on the inside. I wish to know how to tie or bond these walls properly and how to finish same around door and window openings? I would also feel obliged if you would publish sketches of the work, showing how it is done, and give a few details of window trim inside for first and second stories with details for stairs, and other finish you may think necessary?

Ans.—Hollow brick walls are tied together in several ways, both with brick and with iron ties. A cheap, and at the same time an effective method, is shown at Fig.

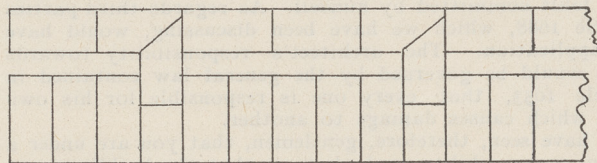


METHOD OF TYING WALL IF FACE BRICK ARE SAME AS BACKING.

FIG. 1.

1., where a "header" is carried over the hollow space at every second brick.

Another method of tying or bonding with brick, is shown at Fig. 2, where the end of the tie-brick is cut to an angle of 45 degrees or mitre. This is a better way

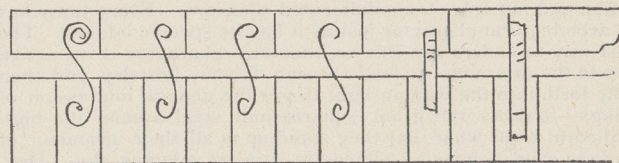


METHOD OF TYING WALL BY CUTTING CORNERS OF FACE AND BACKING

FIG. 2.

than that shown at Fig. 1, but is a little more troublesome; it allows the face of the wall to show an unbroken line of "stretchers", which may sometimes be necessary where the work is to show finished on the inside wall, and pressed or enamelled bricks are used.

At Fig. 3 a method of tying the walls together by the



METHOD OF TYING WITH METAL BANDS.

FIG. 3.

use of iron anchors or wall ties, is shown. The curved ties are made of wire of about three-sixteenth of an inch in diameter and are laid in the wall on every

stretcher, the next course of bricks being laid over them with an ordinary joint of mortar. The flat iron ties shown, may be simply ordinary hoop iron cut in lengths of from six to nine inches long. These are just laid flat on the brickwork as the construction goes on and are covered with mortar when they are inside of the brickwork. All these iron ties must be either coated with tar, or else galvanized to prevent them from corroding. The ties—both in brick and iron—should be laid in the wall every third or fourth course, and in no case should they be more than four courses apart in the height of the building. When properly done a wall of this kind is strong and durable, damp proof and quite warm, providing always the foundation is ample and properly constructed.

We show at Fig. 4, a number of wall tie patterns of more or less value, but, most of them are costly and

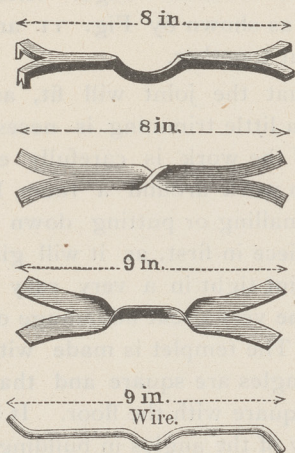


FIG. 4.

are unnecessary for ordinary domestic work. For inside trim for the first story, details are shown at Fig. 5, which are now all the style. The head casings are

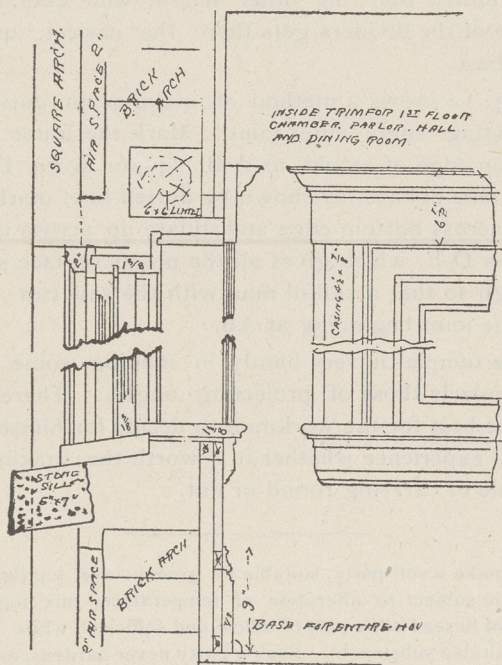


FIG. 5.

wider than the stiles, and are moulded and capped, which give the finish a colonial character. The section shows manner of construction of window frame, sash and general fittings in connection with the brickwork.

The elevation and section of window frame shown in Fig. 6 exhibits the method of finishing windows and

doors in a second story, a kitchen, or main floor if desired. The trim is neat and appropriate. The section shows manner of construction. The same trim will

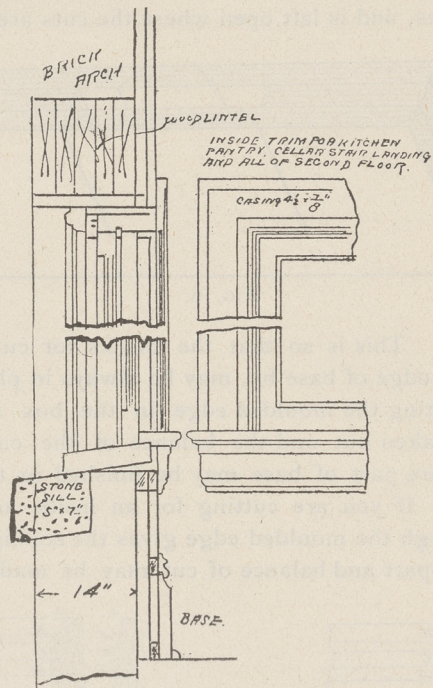
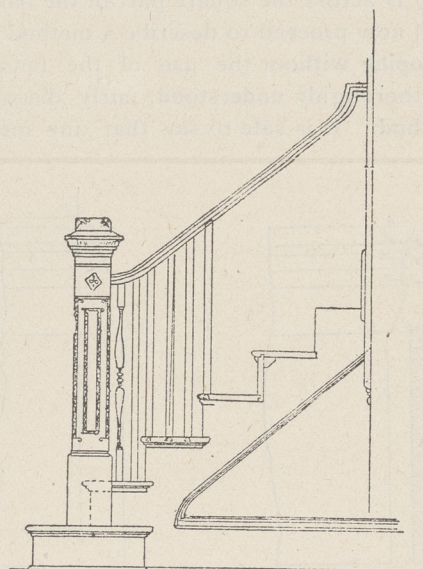


FIG. 6.

answer for doors, the treatment being about the same. The newel, balusters, and style of rail shown at Fig. 7 will be quite appropriate for a house such as we have described other details for. They are simple, economical and effective.

From "Young Workman"—Will you kindly explain, or illustrate the best way to mitre and cope moulded base?

ANS.—This is a pretty difficult task to perform unless the student is on hand to see the work done. To



DETAIL OF STAIRS

Scale, $\frac{3}{8}$ inch=1 foot.

FIG. 7.

describe the method in writing is almost an impossibility so as to make the operation intelligible; however, we submit the following illustration and descriptive matter, which, if followed closely will bring satisfactory results—

Let Fig. 8 represent a templet for mitering the moulded edge of base. It is made just wide enough to take in a piece of base edgewise, and is similar to a miter box with bottom side up. As will be seen the bottom is in two pieces, and is left open where the cuts are made in

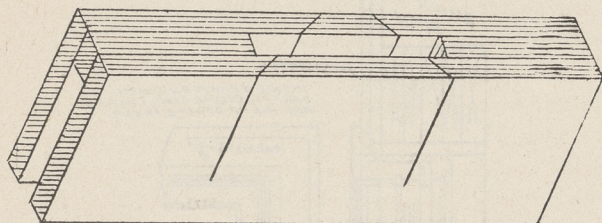


FIG. 8.

the box. This is so that the marks for cutting the moulded edge of base by, may be always in plain view. After cutting the moulded edge in the box the base may be taken out and the balance of the cut across the square part of base may be finished in the usual manner. If you are cutting for an inside angle, the cut through the moulded edge gives the coping line for moulded part and balance of cut may be made square

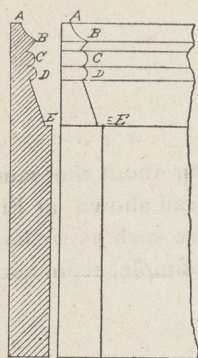


FIG. 9.

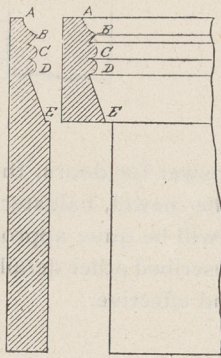


FIG. 10.

as shown by Fig. 10. If you are cutting for an outside or projecting angle, such as mitering round chimney corners, cut in the box through the moulded part as BAE, in Fig. 12, and the miter can easily be continued from E to D across the square part of the base.

We will now proceed to describe a method of mitering and coping without the use of the templet, and which, if thoroughly understood, fairly discounts any other method. It is safe to say that any mechanic of

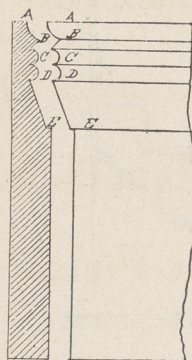


FIG. 11.

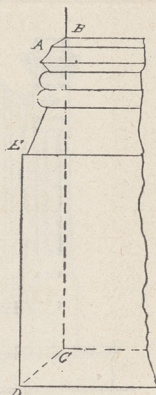


FIG. 12.

ordinary skill will seldom be seen with a templet after a little experience in cutting by the new method.

Referring now to Fig. 9, which represents two pieces of base in position for joining at right angles, as in making an inside angle joint. ABCDE show the members of the moulded edge in the left section,

the same letters and parallel lines show the corresponding members on the face of right hand piece of base. Now take a pair of dividers and scribe the base, locating the points and lines to cut to on the right hand piece. Set the dividers at any proper space, AA for example, and scribe down to BB. Now, the little quirks and heads are difficult to scribe, so just prick with the dividers the center of each member as shown by the dots BCDE on the right section. From D to bottom of base the scribing is easily accomplished and all the points for making the cut are established. To make the cut start in at A and hold the saw on an angle that will just cut the dots BCDE; this will give the correct cut that will give the coping line for moulded edge of base, and from E the cut is continued square to bottom. After the cut is made the base has the appearance of Fig. 10, and is ready for coping the moulded edge. After coping, the appearance is as shown by Fig. 11 and the joint is ready to be put together.

First see that the joint will fit, as it sometimes happens that a little trimming is necessary, although very seldom if the work is carefully executed. It is always best to work around a room left to right in fitting and in nailing or putting down the base; put right end of piece in first, as it will give a chance to squeeze the joint tight in a very easy manner. This method has one very great advantage over the use of the templet. The templet is made with the supposition that all angles are square and that the base always stands square with the floor. It is a well known fact that many of the angles in buildings are not true, and the plasterer generally gets the wall a little thicker just at the floor line than anywhere else, which of course makes the base stand off at the bottom. In most cases it is not enough to notice after the finish is on, but the man cutting joints with the templet will soon notice that the other fellow who cuts by the scribe of the dividers gets there the easiest, quickest and best.

Fig. 12 shows a method of making an outside or projecting angle miter joint. Mark the miter across the top edge of mould, as A B, square down B C on back side of base, as shown by dotted line, mark miter C D across bottom edge and square up across the face side as D E, which gives all the points on face side, or enough so that a skilful man with the saw can readily cut the joint beginning at AB.

The templet is very handy in making some joints, particularly those of projecting angles. Therefore it will be best for the workman to decide for himself from actual experience whether it is worth the making and trouble of carrying round or not.

To make a soft putty, suitable for greenhouses, top lights, &c., that are subject to alteration of temperature, mix together 9 parts of linseed oil, 1 part of tallow and sufficient white lead (or any suitable substance). Such a putty never hardens, and therefore allows for expansion and contraction under different temperatures.

A cheap and effective substitute for putty to stop cracks in woodwork is made by soaking newspapers in a paste made by boiling a pound of flour in three quarts of water, and adding a teaspoonful of alum. This mixture should be of about the same consistency as putty, and should be forced into the cracks with a blunt knife. It will harden like papier-mache, and when dry may be painted or stained to match the bonds.

BY THE WAY.

The selfishness of human nature has been exemplified by many Baltimore property owners who, taking advantage of the demand for accommodation created by the recent fire, have raised rents to double and treble what they were formerly receiving. Short term tenants were given the alternative of paying the exorbitant rates or finding new quarters.

* * *

The difference between a municipal official who is alive to his duties and one who looks upon his position as a sinecure, is well illustrated by the results of a recent change of superintendents of buildings for the Borough of Manhattan. The new superintendent reports:—"When I assumed office there were pending, exclusive of fire escapes and unsafe building cases, over 4,000 violations. During the present quarter, 2,167 new cases have been filed, 5,237 cases have been dismissed, and 757 cases sent to the corporation counsel for prosecution, leaving pending in this office 605 violations, 500 fire cases, and 735 unsafe building cases. Cases in which the time given by the building code to the owner to comply with the law has not yet expired, and they constitute the ordinary current business of this bureau, which is receiving our daily attention."

* * *

A case was heard before Mr. Justice Gibson recently in which Robert J. Dalzell sued Miss Florence O'Mahony to recover 140l. 16s. 9., balance due for work done and materials supplied to her for building purposes. The plaintiff is a merchant residing at Killorin, County Kerry, and the defendant resides at Beau-

fort, near Killarney. She by her defence denied liability, and counter claimed for 63l., and pleaded that the balance had been fully discharged, but lodged 51l. in court. It appeared that the defendant was her own contractor and clerk of works, and that she had obtained part of the materials for the building of her house from the defendant. He advised her against using a certain description of slate for the roof, but she disregarded his advice and followed her own will, and when it turned out a failure in the hands of slaters not used to it, she shifted the blame on the plaintiff. She had the house reslated, and, then counter claimed for the cost, 63l. A large quantity of the correspondence which had passed between the parties was read, among which was a post card which the defendant addressed to the plaintiff, which was in the following terms: "Deluge recommenced; mastic cement not had time evidently to harden before the rain came, and the last rain has made it as soft as putty, and is calmly soaking through. I foresee we shall spend the winter in macintoshes, come down to breakfast under umbrellas, and keep a lifeboat attached to the pump instead of a fire hose. I shall expect you to supply all the above gratis."

Mr. Justice Gibson found for the plaintiff for 124l. 17s. 9d., and allowed the defendant 10l. on her counter claim—The Architect.

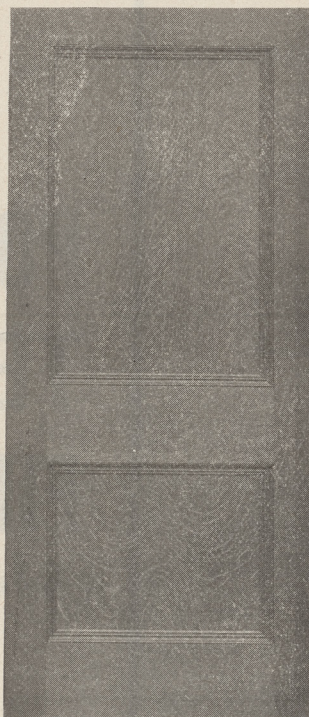
Mr. John Clare, of the firm of Clare Bros. & Co., Preston, Ont., died suddenly on the 21st inst. from a stroke of apoplexy. Mr. Clare, who was 56 years of age, was very highly esteemed in the community where he lived.

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Prices for advertisements will be sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th, and changes of advertisements not later than the 5th day of the month.

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Contributions of value to the persons in whose interest this journal is published are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

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NOTES.

In a recent lecture on geology in Glasgow, Mr. A. McWilliam, A.R.S.M., stated that granite consisted mainly of two minerals, quartz (hardness proportionately 6) and felspar (hardness 7), whilst the hardness of a best-quality Sheffield pocket-knife blade was 6½. The wearing powers of granite would therefore be readily understood. Pure clay with less than about 2 per cent. of potash and soda was a fireclay; if white, a china clay or a pipeclay; while containing 5 per cent. of oxides of iron and generally a fair amount of potash and soda it became an ordinary red brick clay.

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A NEW FLOORING MATERIAL.

Mr. Henry M. Morgan, United States Consul at Lucerne, Switzerland, writes: Architect Siegwart, of Lucerne, has patented a new system of a concrete flooring, consisting of hollow tubes of mortar and iron. It is fireproof, and will, I believe, be of considerable interest to builders in the United States.

It is claimed that this system is an improvement on the inventions of Monnier, Hennebique, Koener, and others. It consists in manufacturing, in a factory, the mortar into hollow beams for forming a floor or roof ready for delivery to the builder—one which can be laid together on the supporting walls without planking. By this means one floor after another can be laid in a very short time, and the floor so laid can be used to work upon at once without scaffolding.

This appears to me as a great advantage compared to the usual devices of stone, plaster, etc., which are dependent largely upon temperature and weather, and

in all cases must be left for some days to dry before they can be walked upon.

One advantage claimed for the Siegwart system is that no workmen are required other than the ordinary laborers. Another fact which should be considered is that armored beams which are made in the building can only be depended upon for uniformity when the mortar is mixed in exactly the same proportions and when it is not influenced by shocks, frost, or rain during the time of setting. When this is done in the factory it is far easier to secure uniformity and protect the beams against weather conditions.

The beams manufactured at Lucerne have a uniform breadth of 25 centimeters (9.84 inches) and are manufactured in five sizes, viz.: 9, 12, 15, 18 and 21 centimeters (3.5, 4.7, 5.9, 7.08 and 8.36 inches) high, according to the length of span and load. The size of the iron rods in the beams is between 5 and 10 millimeters (1.96 and 3.9 inches,) and generally six such rods are used in each beam. Two of these rods are

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laid parallel with the under border of the beam, and the other four are bent upward into the form of a knot at the ends in order to strengthen their holding power. The proportion of cement with coarse sand is 1 to 4. Though the beams are made hollow, they have the same supporting power as though they were solid, with a great reduction of weight. This is an important factor where freight charges are to be considered. The beams, being hollow, offer also more favorable conditions for heating. The sides are ridged, so that the cement for joining them together can enter into the vacant spaces and thus form a solid mass. The laying together of the beams is done exactly as with wooden beams.

The beams are supplied in different lengths. In Lucerne they are made up to 5.5 meters (18 feet) long; in Italy and Germany, up to 6.5 meters (21.3 feet) long; and in Russia, up to 7.5 meters (24.6 feet) long. They can be used, in addition to floors, for terraces, roofs, staircase supports, and for walls where there is side pressure, as, for instance, in coal bunkers, warehouses, etc. It has been demonstrated that with a load from four to five times as great as the normal the beams have only bent to the extent of 1 or 2 millimeters (0.0394 and 0.0788 inch). The chief advantages claimed for these beams are: Great supporting power and security from fire; they come dry and hard from the factory and can, therefore, be used at once as floors for working on; greater facility and speed in building is secured by their use; freedom from excess of heat and cold by reason of their being hollow; thickness of completed floors is reduced by their use; the beams can be used as a heating floor by sending warm air through them.

The manufacture of the beams as practiced in the Siegwart Beam Factory in Lucerne, Switzerland, and in other European countries is very simple. They are

manufactured in layers of 2.5 meters (8 feet) breadth and not singly. The hollow spaces are formed by means of iron molds, around which the cement is laid and the iron rods placed in position. These iron molds are constructed so that they can be reduced in size by the turning of a screw and withdrawn when the cement has become hard. The beams are cut, before the cement has set, by means of a patent cutting machine, which can be placed in any position. Six to eight hours after laying the beams the iron molds can be withdrawn, but they are generally left to harden for four to six days before they are separated. After two to three weeks they are ready for delivery.

There are already a large number of buildings, both public and private, in Switzerland in which the Siegwart beams have been employed, and in all the buildings now in course of construction in Lucerne they are being used. At present there are three factories in Germany, three in Russia and one in Italy occupied in manufacturing beams under the Siegwart patent.

MECHANICS' LIEN LAW.

At the recent session of the Legislature of British Columbia the addition of a number of sections relating to costs was made to the Mechanics' Lien Act of that province. The limit of fees in money or stamps payable to any judge or officer in any action brought to realize a lien is placed at \$1 on every \$100 of the claim up to \$1,000, and this is only payable by persons other than wage-earners. The costs to the plaintiff in any action must not exceed 25 per cent. of the amount of judgment, besides actual disbursements. Where the costs are awarded against the plaintiff such costs must not exceed 25 per cent. of the claim of the plaintiff besides actual disbursements. Where the less expensive course is not taken by a plaintiff the costs allowed to the solicitor must in no case exceed what would have been incurred had the least expensive course been taken. To the costs of discharging or vacating a lien a reasonable amount of costs for drawing and registering a lien may be allowed, in addition to the costs of an action. Costs not otherwise provided for are left to the discretion of the judge or officer to whom application is made.

PERSONAL.

Mr. J. A. Pearson, architect, of Toronto, has recently returned from a visit to Europe.

Mr. A. J. Rattray has recently commenced architectural practice in Toronto, his office being in the Canada Permanent Building.

NOTES.

A striking feature of the new cathedral at Liverpool, England, will be the height of the vaulting of the nave and choir. Measured in the barrel vaulting it will be 116 feet, and in the high transepts 140 feet. No cathedral in the country approaches its height. The nearest is Westminster, the nave of which has a height of 102 feet, while York measures 99 feet; then Salisbury 84 and Lincoln 82. Chester reaches only 78. The "whispering gallery" of St. Paul's Cathedral is 100 feet from the floor.

Incombustible paint for woodwork is prepared by mixing together in a fine powder 20 per cent. pulverized glass, 20 per cent. porcelain, 20 per cent. stone (silicious), 20 per cent. calcium lime. Then mix these compounds with 30 per cent. of silicate of soda. The lime gives unctuousness to the mixture, and by partially combining with the soluble glass, makes a more intimate mixture. Other proportions of the several ingredients can be used, but the percentage of silicate of soda and lime should remain as above. The mixture is applied to the surface in the same manner as ordinary paint. The first coat sets immediately, and the second may be given from six to twelve hours afterwards. Two coats are usually sufficient.

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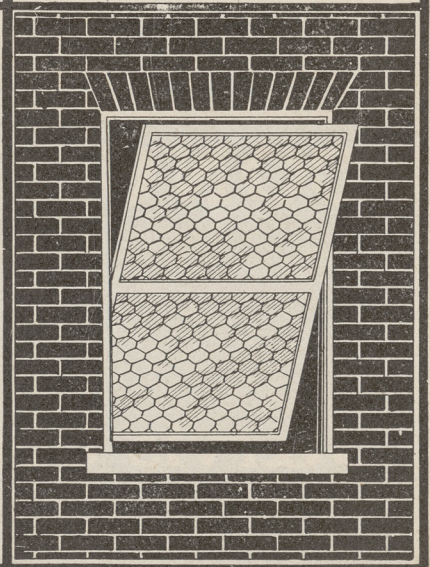
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ARBITRATION OF TRADE DISPUTES.

A conference of representatives of the Ontario Association of Architects, the Architectural Eighteen Club, the Builders' Exchange and the Trades and Labor Council of Toronto, was held a few days ago in the rooms of the Ontario Association of Architects to consider whether an agreement might be reached in which matters under dispute between contractors and workmen might be adjusted by a board of arbitrators and strikes in the building trades avoided. The conference was of a very friendly character, and resulted in the ratification by the persons present of a form of agreement submitted by Mr. W. L. Symons, President of the Ontario Association of Architects. Copies of this agreement will be submitted to the Builders'

Exchange and the Trades and Labor Council for further consideration and approval.

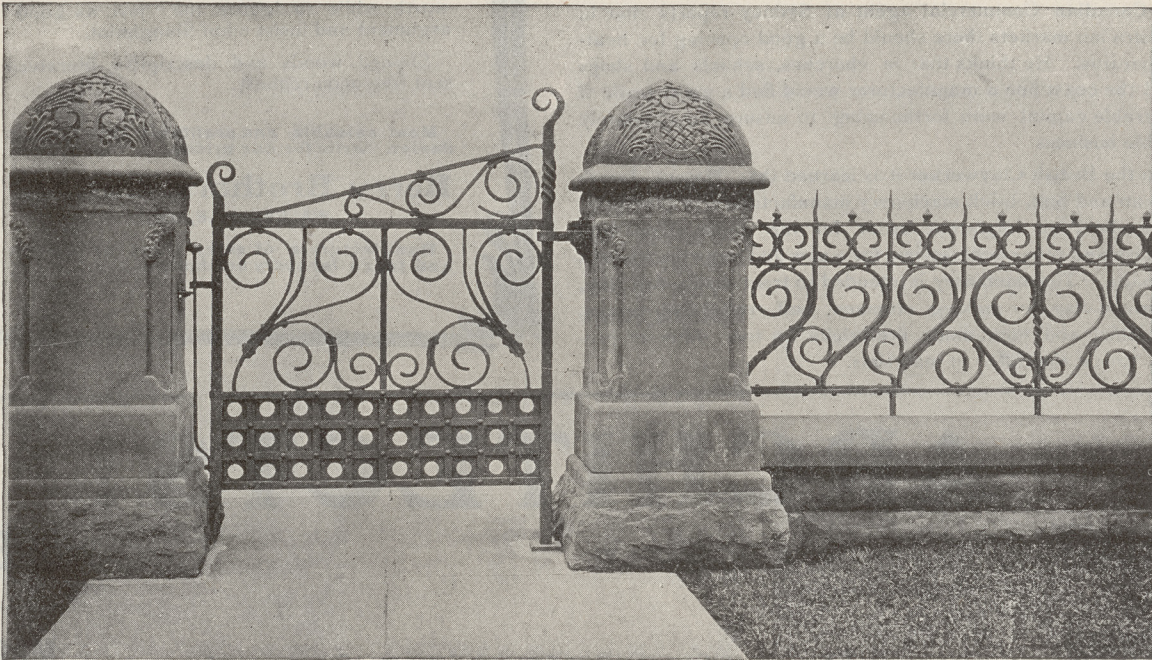
NOTES.

Mr. E. Rodgers, Building Inspector of Winnipeg, reports that up to the end of March, there were 127 permits granted for the erection of 215 buildings, at a total estimated cost of almost three-quarters of a million dollars, or to be exact, \$719,000. In comparison with the same period of last year, the increase in the number of permits is 9; in buildings, 92; in expenditure, \$202,580.

The Western Architect states that machine window glass is reaching the market and elicits most contradictory reports. Some lots are reported as very straight and clear, but thin; while others are said to be thin and anything but straight. A very high authority in the glass trade expresses entire confidence in the ultimate success of the process, and says that the thinness is now being remedied.

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NOTES.

The twin central towers on the Machinery Palace at the World's Fair are 265 feet high.

The carpenters and joiners of Quebec, are demanding an eight hour day and 25 cents per hour.

Building permits to the value of \$300,000 have been issued in Vancouver this year. An active season is looked for, the Building Inspectors estimate being an expenditure of \$2,000,000 as compared with \$1,500,000 last year. A large sum will be spent on the construction of houses, the demand for which greatly exceeds the supply.

One of the twelve massive bronze cornices which are being made for Senator William A. Clark's \$5,000,000 residence in New York City, and two bronze statues for the same structure, have reached the World's Fair for exhibition. The cornices are thirteen feet high and eight feet in width. The style of architecture is Louis XVI. The value of the twelve pieces is \$100,000. The statues are two striking pieces in bronze by George Gray Barbare and are entitled "God Pan" and "The Hearer." Each is cast in a single piece.

BUSINESS NOTES.

The Richter Manufacturing Company, of Tenafly, N.J., manufacturers of burlaps, propose to establish a branch factory in Canada.

The Canadian Commercial agent at Sydney reports that in the Australian markets there should be a good opening for heating apparatus. He thinks that in churches, schools and shops beyond the coast line a manufacturer would find a good trade if considerable capital were forthcoming to ensure an ultimately profitable business.

From the British Clayworker it is learned that Messrs. James Buchanan and Son, brick machinery manufacturers, of Liverpool, have received an important order for the entire plant and machinery and other accessories, for a new and large brickworks for Canada. The machinery is intended to treat shales, fire-clay, also surface clay, for making common, buff, red-facing bricks, also machine and hand-made fire-bricks on four different processes, to suit the different materials.



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